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Identifying the Effect of Temporal Work Flexibility on Parental Time with Children

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Abstract

It is recognized that employment policies must grant flexibility to the working schedules to allow parents to reconcile family and work. By exploiting the particularity of the East German labor market, I identify the causal effect of temporal work flexibility on parental time with children. The analysis unambiguously shows that it allows parents to spend about 30 percent more time with their children. The results can be generalized to Germany as a whole. It can be concluded that temporal work flexibility can be used as a device to mitigate the adverse effect of parental employment on the child's cognitive development.

Keywords: Time Use, Childcare, Flexible Working Schedules, Flexitime, Endogeneity

JEL Classification: J08, J13, J21, J22

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1 Introduction

The stimulation of domestic demand is high on the political agenda of industrialized countries not only in the aftermath of the worldwide financial crisis. The increase in female labor force participation is perceived as one important way to reach this goal by making use of the total available labor force potential in order to spur GDP growth. To facilitate female labor force participation but also to raise female working hours are therefore high on the political agenda. In this respect, concerns about a possible reconciliation of work and family are widely discussed and an extension of the provision of child care facilities is crucial. In recent years, this issue spread and is not merely a female matter any longer. Fathers are more encouraged to take parental leave and women take more advantage of career possibilities.

The increased labor supply, in particular of mothers, over the past decades has created new challenges that must be dealt with in modern societies. Psychologists claim that the first months and years of a child's life are crucial for its cognitive and emotional development so that maternal employment would have detrimental effects.[1] It is both, time and material resources that are important for the cognitive development of children. In particular, parental time is a major determinant for the human capital accumulation of children but its additional function is the intergenerational transmission of economic status (Guryan et al. 2008, Becker 1965). Many economist, sociologist and psychologist have investigated the impact of early maternal employment on the cognitive development of children. But these studies have reached very heterogeneous conclusion and most are not able to establish a causal link. Some articles find a detrimental impact of early maternal employment in particular during the first year of a child's life on its cognitive development in later years (Baum 2003, Ruhm 2004, Hill et al. 2005, Ruhm 2008, Bernal 2008). The strong negative impact is however offset when maternal employment occurs during or after the second years of a child's life (Blau and Grossberg 1992). To mitigate the adverse influences of parental employment, the need for higher degrees of temporal work flexibility is now widely acknowledged which enables parents to spend more time with their children.

The conjunction of high female labor supply and a good provision of childcare facilities as well as a more family oriented employment policy is not new for inhabitants of the former German Democratic Republic (GDR). The necessity to use the total available labor force potential in the post-war country was even intensified by a massive out-migration of younger and better educated East Germans to the Federal Republic of Germany before the construction of the German wall.

[1] See for example Lewis and Brooks-Gunn (1979), Harris (1983), Baydar and Brooks-Gunn (1991)

These developments greatly shaped employment policies already in the early 1950s. In addition, the particularity of the labor market of the GDR allows me to identify and quantify the effect of temporal work flexibility on parental time with children. The German re-unification can be further exploited as a natural experiment and therefore serves as a clear-cut identification strategy. The major contribution of this paper is thus to causally examine the relationship between temporal work flexibility and parental time and to quantify it.

Every citizen of the GDR had the right but also the obligation to work. The freedom of choice of the workplace as postulated in Art. 24 of the constitution of the GDR was however not only restricted by personal qualification but also by the requirements of the central socialist plan. Moreover, educational choices were already strongly influenced and restricted by the socialist plan so that citizens could choose their education to a limited extent (Prantl and Spitz-Oener 2009). Consequently, the allocation of jobs did not necessarily coincide with individual interests or societal needs (Frerich and Frey 1993). Furthermore, the provision of childcare facilities was exceptionally good in the former GDR so that about 95 percent of the 3 – 6 year old children were enrolled in kindergarten in 1989. Contracted working hours were largely determined by the opening hours of daycare centers. Also, flexible working hours were granted only by the firm and workers themselves had no right to choose. It follows that flexitime can hence be viewed as being exogenous. These specifics of the GDR-labor market allow me to identify and estimate the effect of flexitime arrangements on parental time with children in East Germany after re-unification. For the analysis I employ German Time Use Data for the year 1991/92 for East German employees.

Even though being granted flexible working hours cannot be directly influenced by the worker, it is possible that some occupations are more likely to be granted such arrangements. If workers in these occupations are additionally more likely to spend their free time with their kids, OLS estimates would be biased. Yet, I find no evidence for such kind of non-random selection by occupations. I further test whether the results for East German workers can be generalized to all Germans by using GSOEP data for 2002 – 2008. To account for reverse causality, I use an instrumental variable approach. Results indicate similar effects of temporal work flexibility on parental time with kids.

Due to a lack of appropriate data, in particular of panel data, previous research mainly focuses on exploring the dependence between market work and time that parents spend with their kids (Hallberg and Klevmarken 2003, Han 2004, Guryan et al. 2008) and, as mentioned above, the re-

sulting cognitive development of children.[2] Only few studies approach this question by trying to find a causal link. Dustmann and Schönberg (2008) use extensions of maternity leave regulations in Germany as exogenous variation to proxy higher parental time investments. They find that it has no effect on the child's cognitive outcomes. In contrast to that, Carneiro et al. (2010) find strong positive effects of extended maternity leave for Norway. Another strand of the literature is concerned with exploring the influence of working schedules on children's well-being (Strazdins et al. 2004, 2006) as well as the on the time shared by parents and kids (Hill and Stafford 1980, Bryant and Zick 1996, Daly 1996, Zick and Bryant 1996, Milkie et al. 2004). Only very few studies investigate the association between flexible working hours and labor supply (King 1978, Barrett 1982, Macpherson 1988, Euwals 2001). Yet to my knowledge, this is the first paper that analyzes and quantifies the causal effect of flexible working schedules on parental time with children.

The analysis of this paper is organized as follows: in a first step, I will describe the labor market situation and the employment policies of the former GDR in detail. The section further describes the estimation strategy and gives a discussion about potential threats to identification. Section 3 presents the data and shows descriptive statistics on the allocation of childcare related activities and market work over a standard day. The following section discusses the results. In a first step, I compare the determinants of job offering flexibility arrangements to explore potential compositional differences between the respective workers. The following part is devoted to the description of the main effects of work time flexibility on parental time. Section 4.3 tests whether selectivity is present. In the following section I explore whether the results obtained for East Germany also hold for Germany as a whole by investigating GSOEP data for 2002 – 2008. Finally, section 6 concludes.

2 Identification Strategy and Econometric Model

2.1 Background Discussion and Identification Strategy

To identify the effect of temporal work flexibility on the time that parents devote to their children, I concentrate on East German parents only. Labor market and employment policies in East Germany were very distinct from those in West Germany. This section gives an overview about the particularities and presents the identification strategy in more detail.

Already since the 1950s, the need to use the total available labor potential for the stimulation of growth has been recognized by the authorities in the former German Democratic Republic (GDR).

[2] Most studies dealing find a negative association between early maternal employment and the influence on the cognitive development of children (Baum 2003, Brooks-Gunn et al. 2003, Ruhm 2004, Hill et al. 2005, Bernal 2008, Ruhm 2008, Blau and Grossberg 1992).

A major aspect of the employment policies was the integration of the female labor potential into the labor market by ensuring a reconciliation of family and work (Frerich and Frey 1993). Since the VIIIth and the Xth party congress of the Socialist Unity Party (SED) in 1971 and 1972, large social programs were launched by Erich Honecker. These programs were directly aimed at the creation and promotion of measures to encourage female labor participation. In this regard, the provision of childcare facilities for kids under the age of 6 was drastically expanded in subsequent years to create an environment in favor of female labor force participation. In addition, the labor code of the GDR (AGB 1980) postulated explicitly in Art. 240 that each firm is obliged to create possibilities for working mothers to allow for a reconciliation of family and work without further specifications. Moreover, childcare facilities were regulated by law to be open between 7 am and 6 pm (Führ and Furck 1998). For the usage of such facilities, parents were to pay only a very small proportion of their monthly incomes which was used for the provision of food.

According to Art. 167 of the labor code, begin and end of the individual work day of parents were determined between firm and worker but must lie within the opening hours of childcare facilities. Labor unions were also allowed to influence working hours and working time according to Art. 22, AGB yet flexible working hours or even flexitime arrangements were not explicitly formulated in the former GDR. The provision of childcare facilities reached its peak in 1989 so that according to the Statistical Office of the GDR, about 80 percent of kids under the age of 3 were enrolled in crèche in 1989 and even 95 percent of kids aged 3 – 6 were enrolled in kindergarten (Statistical Office of the GDR 1990). Female labor force participation was also highest during this year: employment rates reached 90.6 percent among working age women in 1989.[3]

Art. 24 of the constitution of the GDR (1989) further postulated that each citizen had the right but also the obligation to work and was free to choose his workplace. In reality, however, this freedom of choice was restricted not only by individual qualifications but more importantly by societal demand in conjunction with the central plan. Consequently, labor demand was not determined by profit maximization of firms. Hence, people could choose a suitable job from those provided at a given point in time by the state (Frerich and Frey 1993). This means a priori that the allocation of jobs that was required for the fulfillment of the socialist production plan did not necessarily coincide with interests and needs of the individual employees. Since the VIIIth party congress of the SED in 1971, also occupational choices were to be made according to economic requirements of the centrally planned economy. Young people were to be nudged to choose to

[3] See Frerich and Frey (1993)

work in those occupations that had a great importance within the production process and for the supply of the population of the former GDR at the time of choice. Numerous sanctions and other means of exerting moral pressure were allowed in this process to induce an occupational choice in line with the planned economy. Given such a myopic education policy, it was likely that the available qualification did not match the required one.

To improve the search and matching process given the ever changing economic conditions in accordance with the socialist plan, a planning and steering system for workers and for career advice was established. It was administered by the state secretary and by administrative bodies in the councils of each county or district (Frerich and Frey 1993). These councils had the right to restrict the number of hires but also to wield influence as to the choice of workers. Since firms were able to hire workers only within the limits of the central plan, each individual worker was also at risk of having to change the workplace if required. Over the decades, however, the East-German authorities mainly ensured the labor requirements in the major firms and allowed smaller ones more freedom in choosing their own workers.

The free choice of the workplace was thus *de facto* very limited and workers could not exert any influence on the working conditions that were being offered. The usual endogeneity problem between working hours and parental time that arises when parents are free to choose their workplace in combination with the associated working conditions is therefore not an issue for East German workers. It can therefore be argued that flexitime arrangements are indeed exogenous. Thus, the effect of flexible working hours can be regarded as being causal to the determination of parental time with their children in the case of Eastern German workers.

2.2 Empirical Strategy and Threats to Identification

To estimate the average effect of temporal work flexibility on parental time with children, I estimate the following equation:

$$\ln C_i = \mathbf{X}_i'\beta_1 + \beta_2 F_i + \epsilon_i, \tag{1}$$

where $i = \{m, f\}$ denotes observations for men or women, respectively. The main variable of interest is F_i which takes the value one if the person is granted flexitime arrangements and 0 otherwise. The coefficient of interest is β_2 which captures the average difference in maternal or paternal time with children that result from temporal work flexibility. The random error term is denoted by ϵ.

The dependent variable, $\ln C_i$, is defined in three ways: (i) as minutes of parental time, (ii) as log of minutes of childcare related activities per day or (iii) as fraction of parental time relative to the total time spent on household production. Finally, $\mathbf{X}_i$ is a matrix of individual predetermined characteristics.[4]

The data used are German Time Use data for 1991/92 which were collected two years after the German re-unification. This could be understood as potential threat to identification. Yet, rapidly after the fall of the Berlin wall in 1989, East Germany underwent massive structural changes. According to Burda and Hunt (2001) employment declined by 35 percent between 1989 and 1992 and the East German GDP declined by roughly 30 percent during the same period. Unemployment rose from 0, as claimed by the authorities in the former GDR, to more than 15 percent when only registered unemployed are counted but was even above 30 percent if hidden unemployment (including early retirement, involuntary part-time work, training schemes for the unemployed etc.) were also included. The whole economy of the former GDR was in shambles.[5]

Given the dramatic increase in unemployment, joblessness and non-employment that followed the collapse of the former GDR, uncertainty about the future was high. Consequently, workers were predominantly interested in having *any* job and were less concerned about whether or not it offered flexible working schedules. In addition, the actual level of qualification of East German workers did not necessarily match those qualifications demanded by a market economy. Under such uncertain economic conditions it is hence very implausible that the degree of flexibility granted by a job was a choice criterion for East German parents. The previous argument that flexitime is exogenous therefore still holds.

In addition, the provision of full-time daycare centers was still exceptionally good in East Germany after the German re-unification so that according to the Federal Statistical Office, 114 kindergarten-places were available for 100 children aged 3 – 6 in the former GDR. This fact further reinforces the claim that flexitime was not chosen by workers for childcare concerns. In order to test for the possibility of non-random selection of flexible working hours for workers in certain occupations, I conduct robustness checks in section 4.3.

[4] The matrix includes age, 3 educational dummies, 2 dummies for regional GDP per capita and 2 dummies for the regional structure.

[5] See Burda and Hunt (2001).

3 Data and Descriptive Statistics

This main analysis of this paper is based on German Time Use Data (*Zeitbudgeterhebung*) for the year 19991/92 which were collected by the German Federal Statistical Office (Statistisches Bundesamt 2003). It provides a variety of socio-economic, work and household characteristics. In addition, this dataset contains detailed information about the exact timing and the duration of child related activities and market work for each 5 minute time interval per day which makes it particularly interesting for this study.

The more than 200 activities that respondents engage in during a standard workday are aggregated into four major time use categories: pure leisure, paid market work, household work and tertiary time of which the first three are relevant for the current study.[6] Pure leisure comprises all pleasurable activities which do not need to be undertaken at all and nobody can be paid to do them. Market work is defined as all direct job related activities as well as work-related travel time. Household production captures all activities for which market substitutes can be purchased so that somebody else could be paid to do them and which further satisfy the third-party rule by Reid (1934). All childcare related activities are furthermore attributed to household related activities.

Guryan et al. (2008) infer from their findings that parents perceive the time that they spend with their children as being fundamentally different from home production or leisure even though childcare is both productive and enjoyable at the same time. In this paper, childcare comprises only "primary" activities which are activities that parents directly devote to them such as learning, playing, care in case of illness, changing diapers, washing and feeding the kid, bringing it to bed, to cuddle it etc. All minutes of commuting time related to childcare are also defined as child related time. The data would further allow me to also derive childcare time as a broader concept by additionally including all "secondary" activities namely by including all those time intervals that parents spent in the company of their children. Yet, these activities are however mainly supervisory. In this paper, I will focus on primary childcare activities to capture only those activities that are associated with qualitative interactions between parents and children and thus capture the amount of time that is directly invested by the parent (Guryan et al. 2008).

Information about temporal work flexibility is provided by the respondent who is asked to indicate whether or not the job grants flexitime arrangements. Flextime is broadly defined as the ability to rearrange one's work hours within certain predetermined limits offered by the company.

[6] Intervals of commuting or traveling time are added to the related activity. It can be further noted that an aggregation of the activities into these broad measures is inherently arbitrary. See also Burda et al. (2007).

In most cases, core hours (e.g., 10:00 am to 2:00 pm) are defined during which all employees must be working and are thus required to be on-site. Employees are given some degrees of control over their timing and to fulfill their work commitment (Hill et al. 2001).

3.1 Sample Description

To analyze the effect of temporal work flexibility on parental time, I restrict the sample to employed East German parents aged between 20 and 50 with children under the age of 15. Table 1 reports descriptive statistics by sex. In East Germany, shortly after the German re-unification, almost all of the employed sample men worked full-time and about 81 percent of the employed women. Flexitime arrangements are slightly more likely to be granted to women.

The table further shows, that men are on average slightly older, are more likely to be married and tend to have on average more children than women. The age distribution is similar yet men are slightly more likely to have kids under the age of 3. Also the skill distribution among men and women is similar. The table shows that sample parents are generally well educated but among those with the lowest levels of education, women are represented to a greater extent than men.

3.2 Time Dimension

To get a first impression about the timing of activities across a standard workday, the temporal dimension of activities shall now be described more closely. The distribution of parental time with kids is shown by sex in figure 1. Independent of the gender, parents are most likely to spend time on child related activities around 6 – 8 am but to an even stronger extent in the evening hours between 5 – 8 pm. In addition, women are more slightly more likely to engage in primary child related activities during each time interval per day yet the differences are not very pronounced.

Table 2 reports average minutes spent of childcare activities for all employed East German men and women. In total, sample women spend on average about 48 minutes on primary child related activities while men devote about 9 minutes less time. When differentiating between flexitime status, women tend to devote an average of about 43 minutes to be with their kids when flexitime is not an option but if flexitime is granted, women spend about 18 minutes more on primary child time. For men, in contrast, the table shows only very little differences by degree of flexibility of working schedules.

The relatively low average minutes of primary childcare time are strongly driven by the fact that about 31 percent of all women and about 38 percent of all men with children under the age of 15 report not have spent any primary time during the particular day with their kids. Measuring

Table 1: TU: Summary Statistics for All Employed Workers by Gender.

	women	**men**
individual characteristics:		
age	34.282	35.905
	(5.671)	(6.022)
low skilled	0.039	0.027
	(0.194)	(0.162)
medium skilled	0.581	0.579
	(0.494)	(0.494)
high skilled	0.380	0.394
	(0.486)	(0.489)
married	0.808	0.905
	(0.395)	(0.293)
household characteristics:		
# of kids	1.984	2.036
	(0.818)	(0.866)
kids ≤ 3	0.175	0.195
	(0.380)	(0.396)
kids aged 3–6	0.250	0.257
	(0.433)	(0.437)
kids 6–10	0.262	0.230
	(0.440)	(0.421)
kids 10– 15	0.314	0.318
	(0.464)	(0.466)
work characteristics:		
full-time employed	0.811	0.981
	(0.392)	(0.135)
flexitime	0.219	0.184
	(0.414)	(0.388)
N	561	591

Standard deviations are given in parentheses.

the minutes of parental time, only of those workers who reported non-zero time with their kids show about 69 minutes maternal time with kids and about 63 minutes in the case of men. Figure 2 shows the distributions of non-zero parental time by gender. It shows that the proportion of parents who spend only little primary childcare time is higher high. In addition, figure 8 in the Appendix illustrates the distribution of parental time by age group of their children. It shows that the high share of parents who spend only little primary childcare time is strongly driven by parents with older kids.

Figure 1: Time Use: Distribution of Parental Time with Kids across a Standard Day for Employed Parents by Sex.

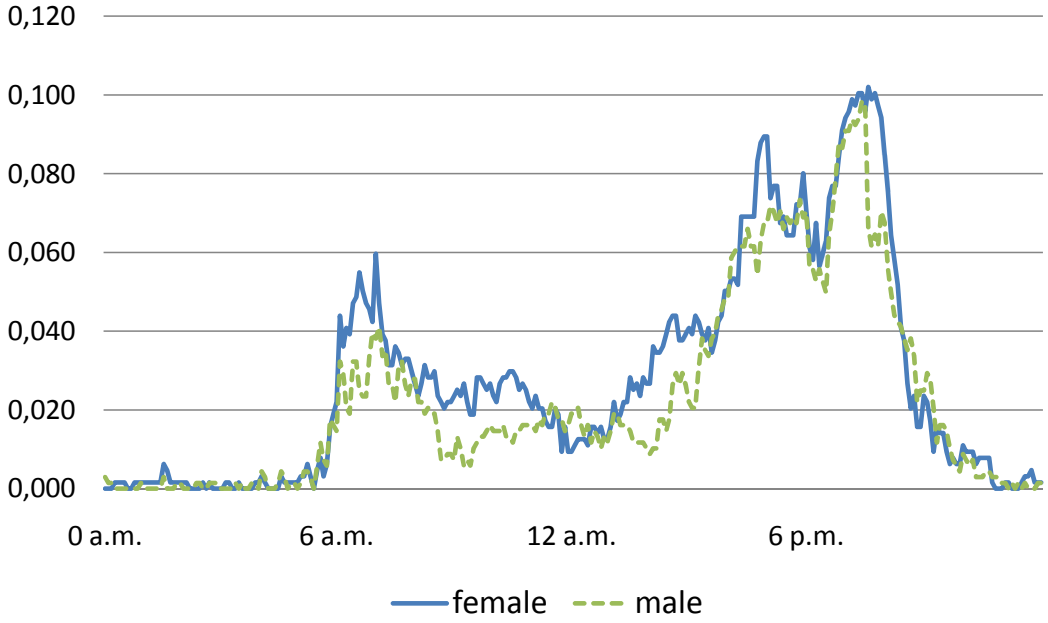
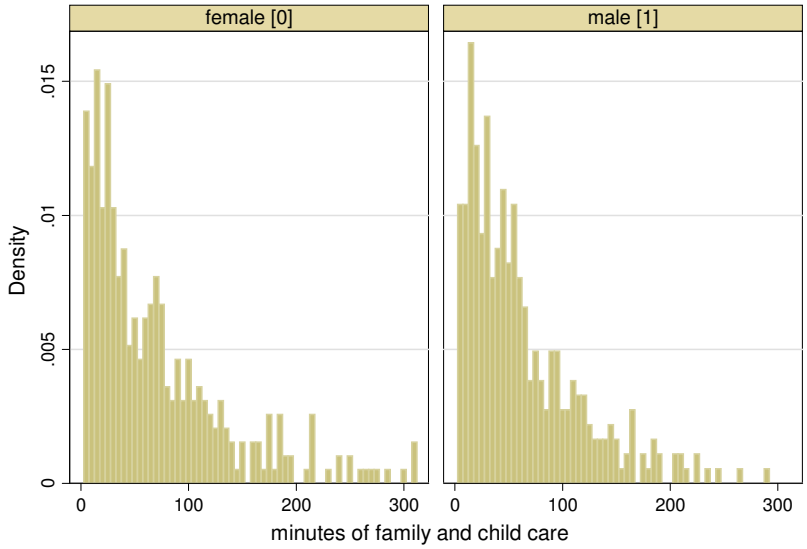


Figure 2: Time Use: Distribution of Non-Zero Parental Time of Employed Workers by Sex.



In addition to the absolute minutes of parental time, table 2 reports the fraction of parental time relative to the minutes of household work. This fraction amounts to 21 percent for all men independent of flexitime status and it ranges between 21 and 28 percent for women depending on whether people work flexitime or not.

Table 2 also shows the hours of market work and of household production for all employed men and women. While women report to work in general about 418 minutes (7 hours), men devote on average about 34 minutes more to market work.[7] It is interesting to note that both women and

[7] Note that diaries for weekdays but also during weekends are considered here.

Table 2: Allocation of Time by Employed Workers by Sex Depending on Whether or not the Job Offers Flexitime.

	women			**men**		
	all	no flex.	flex.	all	no flex.	flex.
min. of child time	47.65	43.79	61.38	38.71	38.27	40.64
	(61.91)	(58.87)	(70.24)	(51.56)	(51.51)	(51.98)
fraction of household time	0.22	0.21	0.28	0.21	0.21	0.21
	(0.24)	(0.24)	(0.25)	(0.26)	(0.26)	(0.24)
min. of homeproduction	217.19	222.51	198.05	186.42	189.74	171.76
	(166.49)	(172.70)	(140.90)	(137.06)	(150.96)	(122.62)
min. of market time	418.36	407.24	453.33	452.78	442.95	489.05
	(282.01)	(288.43)	(254.73)	(273.64)	(281.14)	(235.33)
N	561	438	123	591	482	109

Standard deviations are given in parentheses.

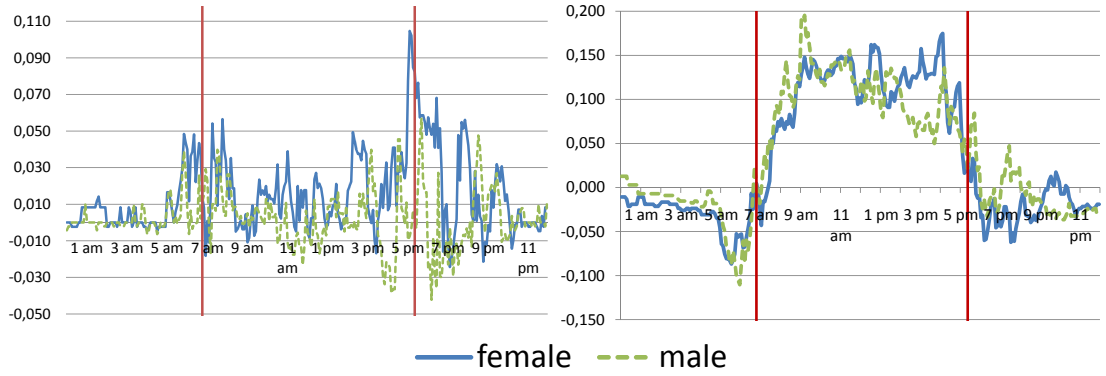
men who are granted flexitime arrangements tend to work longer hours and to spend more time with their children. Women with flexitime arrangements work about 46 minutes longer but tend to devote about 25 minutes less on household work. This is in line with the third party rule by Reid (1934) according to which people substitute household work with market equivalents with higher with fewer hours of market work or higher opportunity costs of leisure. Differences for men with respect to market work are similar but they tend to devote only about 18 minutes less to household work compared to those who do not work flexitime.

Finally, the left panel of figure 3 gives an additional graphical representation of the difference in the allocation of parental time during each time interval t by gender depending on flexitime status. Positive values indicate that market work during the particular time interval is more common among parents who are granted temporal work flexibility. Vertical lines indicate the boundaries of the standard workday in East Germany according to the data.[8] Differences in parental time with children are noisy given the relatively small number of observations yet they are highest around the boundaries of the standard workday. This indicates that it is in particular those time intervals that parents who are more flexible with respect to the allocation of market work use more to be with their kids.

The right panel of figure 3 illustrates differences in the distribution of working hours depending on flexitime status for every time interval t across a day. Again, positive values indicate a higher

[8] It is defined by the average start of the workday and the average end of the workday in East Germany in 1991/92 reported by all respondents.

Figure 3: Time Use: Difference in the Distributions of Parental Time with Kids (left) and Market Time (right) for Employed Workers by Sex Depending on Flexitime Status.



propensity of work for people with flexitime arrangements during the t-th time interval. The graph reveals that parents who are granted flexitime arrangements are more likely to work during standard hours as compared to the reference group. Moreover, they tend to start their workday slightly later but also tend to end it slightly later on average. In the evening hours, work after 6 pm is less common for women when their jobs allow for flexitime while the opposite holds for men.

4 Results

4.1 Determinants of Flexitime

In a first step, I want to explore the determinants of being granted flexitime work in more detail which help us to detect potential compositional differences across these groups. In addition, it is an additional check of the validity of the identification strategy. Marginal effects by employment status and gender are reported in table 3. It shows that age is positively yet insignificantly associated with the probability to work flexitime in the case of female workers. Older men, in contrast, tend to have a lower probability. The level of education has no significant influence for either men or women. Additionally, being married or having an employed partner does also not significantly affect the probability to work flexitime. The fact that individual characteristics do not seem to play a role for being granted flexitime arrangements underlines the identification strategy according to which workers in East Germany had no choice to determine their degree of temporal work flexibility.

The major determinants are workplace characteristics. The table shows that being a white-collar workers and an employee in the service sector has the highest impact on being granted flexitime. Among the employed workers, having a white-collar job increases the probability by 20

Table 3: TU: Marginal Effects for the Choice to Work Flexitime by Sex and Employment Status.

	employed		**full-time**	
	female	male	female	male
personal characteristics:				
age	0.001	-0.007*	0.002	-0.007*
	(0.33)	(2.12)	(0.42)	(2.22)
low skilled	0.031	0.066	0.047*	0.053
	(0.33)	(0.72)	(0.42)	(0.56)
high skilled	-0.038	0.005	-0.050	0.005
	(1.10)	(0.15)	(1.33)	(0.14)
married	-0.017	0.039	0.002	0.018
	(0.39)	(0.69)	(0.04)	(0.30)
employed partner	-0.064	-0.004	-0.062	-0.010
	(0.91)	(0.08)	(0.84)	(0.18)
household characteristics:				
# of kids	-0.051*	-0.029	-0.051*	-0.027
	(2.36)	(1.54)	(1.92)	(1.43)
kids 3–6	0.058	0.081*	0.078	0.076
	(1.15)	(1.71)	(1.30)	(1.56)
kids aged 6–10	-0.067	0.042	-0.045	0.037
	(1.23)	(0.82)	(0.69)	(0.70)
kids aged 10–15	0.061	0.139*	0.069	0.130*
	(1.03)	(2.64)	(1.02)	(2.42)
workplace characteristics:				
white-collar	0.197*	0.152*	0.178*	0.148*
	(5.94)	(5.11)	(4.54)	(4.86)
log labor income	0.098*	0.014	0.096*	0.011
	(2.21)	(0.61)	(1.77)	(0.54)
service sector	0.116*	0.108*	0.137*	0.112*
	(3.41)	(3.61)	(3.55)	(3.66)
regional characteristics:				
GDP [30.000 DM; 35.000 DM]	0.109*	0.104*	0.086*	0.112*
	(2.33)	(2.29)	(1.68)	(2.41)
regions with some agglomeration	-0.125*	-0.066	-0.130*	-0.063
	(2.67)	(1.42)	(2.63)	(1.37)
rural	0.096*	0.090*	0.126*	0.090*
	(2.06)	(2.15)	(2.55)	(2.13)
unemployment rate: 12.5% – 15%	-0.054	-0.017	-0.094*	-0.020
	(1.18)	(0.43)	(1.95)	(0.48)
N	561	591	455	580
R^2	0.191	0.129	0.190	0.129

Absolute $z-$ statistics in parentheses. * indicates significance levels of 10%.

percent for women and by 15 percent for men. Female service sector employees tend to be 12 – 14 percent more likely to have some degree of flexibility and men have 10 – 11 percent higher probabilities. Women with higher incomes tend to be more likely to work in such jobs while the wage rate is has no significant influence in the case of men.

The table furthermore shows differences in regional characteristics. The probability to work in such jobs is highest for East Germans who live in regions with the highest level of GDP per capita of all new länder. In regions with only some agglomeration, workers tend to have a lower probability as compared to urbanized regions yet flexitime arrangements are most likely to be granted in rural regions. In addition, the table shows that those East German workers living in regions with the highest unemployment rate (12.5 – 15 percent in 1991/92) tend to be less likely to be offered such working conditions.

When the household composition is regarded, table 3 reveals that parents with more kids tend to be less likely to be granted flexitime arrangements. Moreover, the age of kids, however, has no significant influence on this probability for women. For fathers, I only find that having children aged 3 to 6 years or kids older than 10 is positively associated with the probability to work flexitime. These findings further emphasize the earlier claim that people do not choose to work flexible hours for childcare concerns. If people were free to choose the working conditions of the job, one would rather expect a positive association with respect to the number of children and also for younger kids.

The combination of the employment policies in the former GDR in and the ubiquitous provision of childcare facilities provide work environments in favor of higher levels of female labor force participation in East Germany and pronounced rates of full-time employment. These are also reflected in the sample of women of this study. The determinants of the probit regressions described here, in particular regarding age and number of children, further corroborate the validity of the identification strategy that East German parents were not able to choose flexible working schedules. Hence, such work arrangements can rather be understood as gift granted by the employer mainly to people in white-collar jobs and employees in the service sector (Guryan et al. 2008).

4.2 Does Temporal Flexibility Increase Parental Time with Kids?

4.2.1 Baseline Results

I will now turn to the analysis and quantification of the causal effect of temporal work flexibility on parental time with children. Estimation results are reported in table 4. It shows the coefficient estimate of the flexitime indicator for the absolute minutes of parental time (1), log minutes of childcare time (2) and the fraction of child time respective to total household work (3) by gender and employment status. The table shows that flexitime in mainly exploited by mothers to spend more time with their kids, while no significant differences are found for fathers. More precisely, women who work in jobs that grant some degree of temporal flexibility spend on average about 15 minutes more on primary childcare related activities than those women who do not. Given the comparatively low amount of time that all employed mothers spend on primary childcare time (47.65 minutes on average) as presented in table 2, the effect is sizable. If the coefficient estimate is expressed relative to the average maternal minutes spend with kids, these 15 additional minutes corresponds to an increase of 30 percent resulting from flexitime. In addition, mothers who are granted some temporal work flexibility tend to work on average more. Keeping this in mind further emphasizes the very sizeable impact that such work arrangements have on maternal time with kids. This is in line with Guryan et al. (2008) who argue that childcare time is inherently different from both household work and leisure. In addition, it underlines the results by Bianchi (2000) who finds that average maternal time with children did not decline drastically over the years in the presence of maternal employment.

Men, in comparison, who are granted flexible working schedules do not spend significantly more time on primary childcare related activities. Full-time employed men spend about 4.5 minutes more on childcare time if they are granted flexible working hours yet this effect is not significant. This finding is not surprising given that such activities are considered to be predominantly female tasks.

Yet, as shown earlier, many parents, particularly with older children, report zero minutes of primary childcare time. To account for that the second panel of table 4 reports the effect of flexitime arrangements only for those parents who report non-zero childcare activities. Accordingly, employed mothers with some temporal work flexibility spend on average about 24 log points or 27 percent more time to be with their kids. By restricting the sample to full-time employed mothers, results in 27 log points or about 30 percent more maternal time. For men, flexitime does not result in more paternal time with kids.

Table 4: Estimation Results for the Flexitime Indicator on Child Related Time and the Fraction of Total Household Time by Gender and Employment Status.

	employed		**full-time**	
	female	male	female	male
1. minutes of child time:				
flexitime	14.812*	3.073	14.586*	4.515
	(2.24)	(0.59)	(2.04)	(0.86)
N	561	591	455	580
R^2	0.138	0.105	0.132	0.104
2. log minutes of child time:				
flexitime	0.240*	0.018	0.266*	0.043
	(1.90)	(0.14)	(1.83)	(0.33)
N	389	365	318	356
R^2	0.084	0.096	0.074	0.095
3. fraction of total household time:				
flexitime	0.072*	-0.008	0.067*	-0.007
	(2.93)	(0.31)	(2.64)	(0.25)
N	561	591	455	580
R^2	0.105	0.088	0.118	0.086

Absolute $t-$ statistics in parentheses. * indicates significance levels of 10% or higher. Standard errors are robust. Additional control variables: age, 2 skill dummies, a dummy for being married as well as regional dummies accounting for GDP per capita and agglomeration type.

Finally, when parental time is regarded relative to the total time devoted to household activities – as given by the third panel of table 4 – mothers spend about 7 percentage points more of their total household activities on child time when flexitime is granted. Given that women spend on average about 22 percent of their total household time on primary child time, an increase by 7 percentage points for mother who are granted flexitime arrangements corresponds to an increase of about 32 percent. The effect for men, in contrast, is again low and insignificant.

These baseline findings suggest that women, who are granted some degree of temporal work flexibility, use this freedom to spend a huge amount of time more on childcare related activities. These results can be interpreted as strong evidence in favor of an enhanced reconciliation of family and work. Given that parents and specifically mothers with flexible working schedules work on average longer hours as compared to the reference group, these figures emphasize the very sizeable positive influence even more. It allows parents to spend more quality time with their children

and not to concentrate merely on satisfying basic needs. Moreover, the results suggest that time investments are relatively elastic to changes in the allocation of work.

4.2.2 By age of children

Until so far, only average effects of temporal work flexibility on parental time were analyzed, independent of the age of the child. Younger children need more time from both parents and time investments are found to be most effective in the first year of a child's life (Carneiro et al. 2010). In this section, I will therefore analyze and quantify the effect of temporal work flexibility depending on the age of children to derive additional information about the relative gain from flexitime. Table 5 reports coefficient estimates of the flexitime indicator by age group of children for all employed parents by gender.

With children under the age of 3 only, being granted some degree of temporal work flexibility increases maternal childcare time by 50 minutes. Yet, the size of these estimates must be regarded with great caution as the number of observations for these workers is very low. It is specifically these first three years of a child's life during which time and resource investments are most effective for the cognitive development of children.[9] However, also maternal employment is found to have the highest influence during these years. The estimates show that granting some degree of temporal work flexibility to mothers strongly increases time with kids. It is hence an important tool that contributes to a mitigation of the adverse effects of employment on the cognitive development of children. In this respect, such work arrangements do not only help mothers with very young kids to reconcile family and work but they also have a positive impact on the child himself. Also fathers with children under the age of 3 tend to spend about 13 minutes more time with their children when flexitime is granted yet this effect is not accurately measured.

The table also shows that mothers tend to spend about 55 log points or 73 percent more on primary childcare related activities with children under the age of 3 when only positive values of child time are considered. Given the low number of observations, these finding must again be regarded with caution. Father, in contrast, devote about 34 log points or about 40 percent more time to such activities yet the estimate is marginally insignificant. When the fraction of child time relative to the total amount of household work is regarded, mothers with kids under the age of 3 devote about 20 percentage points more of their total household time to childcare activities when flexitime is possible. Fathers, in contrast, tend to spend about 6 percentage points more to be with

[9] See for example Baum (2003), Brooks-Gunn et al. (2003), Ruhm (2004), Hill et al. (2005), Ruhm (2008), Bernal (2008)

their kids but the coefficient estimate is again not statistically significant. Children under the age of 3 have also much shorter waking hours than their parents. The drastic positive effect of flexitime, particularly in the case of mothers, reflects this fact. Stress induced by having to deal with job and family is slightly reduced for the respective parent. A possible redistribution of the allocation of activities might be entailed by such working schedules yet the low number of observations does not allow for a detailed investigation of this hypothesis.

Table 5: Estimation Results for the Flexitime Indicator on Child Related Time and the Fraction of Total Household Time for Employed Workers by Gender, Depending on the Age of the Child.

	women			**men**		
	min. of child time	log min.	frac. of hh time	min. child time	log min.	frac. of hh time
kids ≤ 3	50.527*	0.549*	0.202*	13.516	0.339	0.057
	(2.25)	(1.88)	(3.85)	(0.87)	(1.59)	(0.93)
N	98	83	99	115	99	115
kids ≤ 6	28.858*	0.524*	0.123*	18.499*	0.328*	0.045
	(2.51)	(3.64)	(3.10)	(2.02)	(2.31)	(1.09)
N	238	181	239	267	205	268
kids ≤ 10	20.352*	0.457*	0.087*	14.981*	0.276*	0.027
	(2.39)	(3.60)	(2.83)	(2.07)	(2.14)	(0.84)
N	385	298	386	403	296	405
kids ≥ 10	18.389*	0.255	0.086*	-6.047	-0.542*	-0.018
	(2.11)	(0.86)	(2.32)	(1.49)	(1.93)	(0.50)
N	176	91	176	188	69	188

Absolute t- statistics in parentheses. * indicates significance levels of 10% or higher. Standard errors are robust. Additional control variables: age, 2 skill dummies, a dummy for being married as well as regional dummies accounting for GDP per capita and agglomeration type.

With increasing age, children need or even want less care from their parents. Time investments have a less drastic effect on the child's cognitive development. Moreover, with increasing age the importance of secondary childcare time is likely to increase drastically which is however not considered here. The lower time inputs lead to lower additional time that parents spent with their kids when being granted flexitime arrangements. Women with pre-school kids devote about 29 minutes more of their available time to be with their kids if their jobs allow for some degree of flexibility. Mothers with kids under the age of 10 enjoy only about 20 minutes more on childcare time. The mitigating effect of fathers with increasing age of their kids declines slightly when

their working hours allow for some degree of flexibility. Restricting the sample to parents who report non-zero childcare time reveals a relatively stable and very pronounced positive effect of flexitime. Accordingly, mothers tend to devote between 46 to 52 log points (58 – 69 percent) more time when their kids are under the age of 10. Fathers tend to spend on average about 28 – 33 log points (32 – 39 percent) more time with their kids. Relative to total household time mothers tend to have between 9 to 12 log points higher childcare fractions; paternal fractions are positive yet not statistically significant. This emphasizes the hypothesis that parents spend more quality time with their children which goes beyond the satisfaction of basic needs.

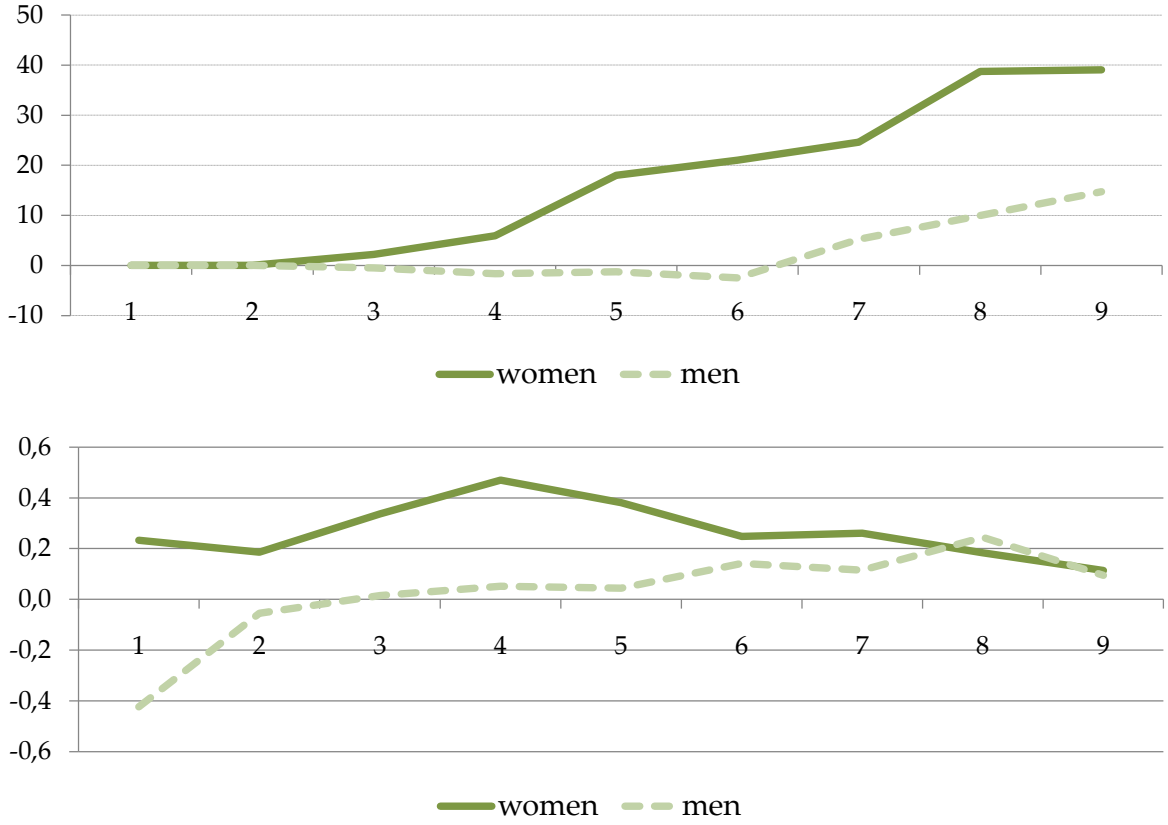
For kids older than 10, the effect of temporal work flexibility on parental time diverges for mothers and fathers. While mothers still tend to devote about 18 minutes more time, fathers tend to have different priorities when flexitime is possible. They are found to spend about 6 minutes less on child related activities than fathers who cannot influence their working schedules at all. Yet these estimates are marginally insignificant. Mothers who report non-zero minutes of primary child time have about 26 log points more with their kids while fathers with older kids reduce these activities by even 54 log points. This suggests that a large fraction of fathers in this age group reports zero minutes of childcare time which strongly upward biases the overall results for these fathers. Those who indeed spend time with their children do so to a significantly lower extent when flexitime is possible. The number of observations is however considerably low so that these differences shall not be over-interpreted.

All findings obtained so far, point into the same direction: flexitime is used by parents to spend more time with their kids. It is most effective for very young children. These effects can be understood as evidence that such working conditions allow for a better reconciliation of family and work. This flexibility is also an important means to mitigate the adverse effect maternal employment on the child's cognitive development in particular during the first year of the child's life.

In addition, figure 4 gives a graphical representation of the coefficient estimates of the flexitime indicator by decile and gender. The upper panel reports coefficient estimates of flexitime on minutes of parental time with children. It shows for men and women likewise that with increasing childcare time, differences by flexitime status increase significantly for mothers and are insignificant across the distribution for fathers. At the median, women tend to spend 18 minutes more time with their kids when flexitime arrangements are granted. At the 9th decile, differences amount to a maximum of 39 minutes.

The lower panel of figure 4 shows differences in the coefficient estimate by quantile for the log minutes of parental time to only consider parents who indeed spend some primary time with

Figure 4: TU: Coefficient Estimates by Decile and Gender on Minutes of Childcare Time (upper panel) and Log Minutes (lower panel).



their kids. This picture is different to the previous one. It shows that women who work flexitime, spend more time with their kids across the whole distribution of parental time yet differences are inaccurate in most cases. I hence find that women in the lowest decile devote about 23 log points more time and in the highest decile, the difference shrinks to 11 log points. For fathers, differences are rather low and insignificant across the whole distribution.

It can hence be concluded from these estimates that flexitime allows mothers to schedule their working hours in such a way as to spend more time with their children and it is found to have no direct influence on East German fathers in 1991/92. Maternal differences increase with the decile of the child time distribution.

4.2.3 Determinants of Parental Time

All determinants of parental time with kids are reported in table 6 to minimize the risk of to identification introduced by bad controls.[10] The table shows that only few of the determinants have a significant influence on parental time.

[10] See Angrist and Pischke (2009) for potential biases induced by including bad controls into the regression.

Table 6: Time Use Data: Determinants of Time Devoted to Childcare in Eastern Germany by Sex for All Employed Workers.

	minutes		**log minutes**		**fraction**	
	female	male	female	male	female	male
flexitime indicator	14.812*	3.073	0.240*	0.018	0.072*	-0.008
	(2.24)	(0.59)	(1.90)	(0.14)	(2.93)	(0.31)
age	-2.284*	-2.271*	-0.030*	-0.038*	-0.011*	-0.011*
	(5.20)	(6.65)	(3.06)	(4.52)	(6.17)	(7.43)
low skilled	-14.184	-11.145	-0.321	-0.004	-0.069*	-0.071*
	(0.87)	(1.00)	(1.15)	(0.01)	(1.86)	(2.07)
high skilled	4.138	-4.654	0.064	0.038	-0.015	-0.031
	(0.75)	(1.08)	(0.54)	(0.37)	(0.70)	(1.43)
married	-30.335*	8.640	-0.343*	0.217	-0.019	0.093*
	(4.00)	(1.20)	(2.76)	(1.39)	(0.89)	(3.15)
GDP dummies	yes	yes	yes	yes	yes	yes
agglomeration type	yes	yes	yes	yes	yes	yes
N	561	591	389	365	561	591
R^2	0.138	0.105	0.084	0.096	0.105	0.088

Absolute $t-$ statistics in parentheses. * indicates significance levels of 10% or higher. Additional control variables: a dummy accounting for weekend diaries, 2 dummies controlling for GDP by regions and two dummies for agglomeration types.

Older parents tend to spend less time with their kids. This is easily explained by the fact that the age of children and their parents are positively correlated. Hence, kids of older parents tend to be older and need less care and attention of their parents. The age effect is of similar size for male and female workers and an increase of ten years reduces parental time by about 23 minutes or by 30 percent. The parent's education does not have a strong and significant effect on parental time. Maternal time is positively correlated with education so that low skilled parents spend generally less time on childcare activities as compared to medium skilled workers. Mother with higher skills, in contrast, are found to invest slightly more time yet the effect is not significant. High-skilled fathers seem to have different priorities. They are found to devote slightly though insignificantly less time to childcare related activities than fathers with medium educational attainments. The estimates furthermore show that while married mothers devote about half an hour less time to childcare related activities, the opposite holds for fathers. Husbands devote on average about 8.6 minutes more on time with their kids. These effects indicate that married couples share childcare responsibilities.

I additionally control for regional characteristics and find that parental time is lowest in regions with the lowest GDP per capita. This finding can be explained by the fact that parental time invest-

ments are positively associated with incomes at the disadvantage of their kids. Parents who live in regions with lower incomes rather worry about earning enough income to financially support their families (Guryan et al. 2008). The same argumentation holds for people living in rural areas which tend to be poorer on average. People therefore tend to spend less time on childcare related activities while parental time is higher in more urbanized areas.

4.3 Robustness Check

In section 4.1, I have shown that individual characteristics do not determine the probability to be granted flexitime arrangements or not. However, such working conditions occur to a greater extent in particular industries and occupations namely in the service sector employees and among white-collar workers.

To further test this assumption, table 7 additionally shows the sample composition by flexitime status and by gender. By means of a simple t-test, I check whether the explanatory variables differ among the groups. Columns (3) and (6) report the respective p-values of the t-test for each variables separately. The dependent variables significantly differ for sample women yet there are no significant differences among men. Since these are the dependent variables, differences among the groups are essential for finding any effects of working flexitime using econometric techniques.

The t-test of the explanatory variables by flexitime status and gender reveals no significant differences. This finding corroborates the validity of the identification strategy and it can be argued that differences in parental time result from different allocations of market work but are not driven by different sample compositions. Non-random selection might originate from different channels though as described earlier.

In the former GDR, workers were assigned to particular jobs and could not choose it because of childcare concerns, for example. Table 8 reports the average incidence of flexitime arrangements by gender for different occupations in Eastern Germany for 1991/92. It shows that among men and women, flexitime is most likely to be granted in office occupations, in the textile industry as well as in social service jobs. Management employees as well as engineers and merchants are equally likely to be offered some degree of flexibility. These occupations tend to require a higher degree of education so that it can be argued that it is rather the better educated workers who benefit most from flexible working schedules. As Guryan et al. (2008) show better educated workers tend to spend quantitatively and qualitatively more time with their kids.[11] If a variable that

[11] See also Bianchi and Robinson (1997), Bryant and Zick (1996), Datcher-Loury (1988), Leibowitz (1977).

Table 7: TU: Summary Statistics for Employed Workers by Flexitime Status and Gender as well as *t*-tests for Compositional Differences.

	female			**male**		
	no flex.	flex.	t-test	no flex.	flex.	t-test
	(1)	(2)	(3)	(4)	(5)	(6)
dependent variables:						
minutes	43.790	61.382	0.005	38.268	40.642	0.665
	(58.867)	(70.243)		(51.517)	(51.980)	
log minutes	3.705	3.983	0.025	3.752	3.778	0.840
	(1.029)	(1.054)		(0.921)	(1.044)	
fraction of hh time	0.208	0.278	0.005	0.214	0.211	0.908
	(0.241)	(0.248)		(0.259)	(0.244)	
individual characteristics:						
age	34.201	34.569	0.525	35.929	35.798	0.837
	(5.702)	(5.569)		(5.994)	(6.169)	
low skilled	0.039	0.041	0.926	0.027	0.028	0.975
	(0.193)	(0.198)		(0.162)	(0.164)	
medium skilled	0.587	0.551	0.609	0.593	0.514	0.129
	(0.493)	(0.498)		(0.492)	(0.502)	
high skilled	0.374	0.398	0.630	0.380	0.459	0.128
	(0.485)	(0.492)		(0.486)	(0.501)	
married	0.822	0.756	0.102	0.907	0.899	0.808
	(0.383)	(0.431)		(0.291)	(0.303)	
work characteristics:						
full-time	0.817	0.789	0.473	0.979	0.991	0.420
	(0.387)	(0.410)		(0.143)	(0.096)	
N	438	123		482	109	

Standard deviations are given in parentheses.

affects both the occupation-specific propensity for flexitime arrangements and average parental time with children within this occupation is not controlled for but has a systematic impact, the coefficient estimate of the flexitime indicator will be biased. In this section, I will therefore test for potential non-random selection of workers in different occupations.

For an identification of potential non-random selection, I use three different exclusion restrictions. As shown earlier, service sector employees and employees in white collar-occupations have a greater probability to be granted flexitime arrangements. I therefore include two dummies accounting for these conditions into the choice equation. The major exclusion restriction, however, is the average rate of flexitime work in different occupations and different sectors for Germany de-

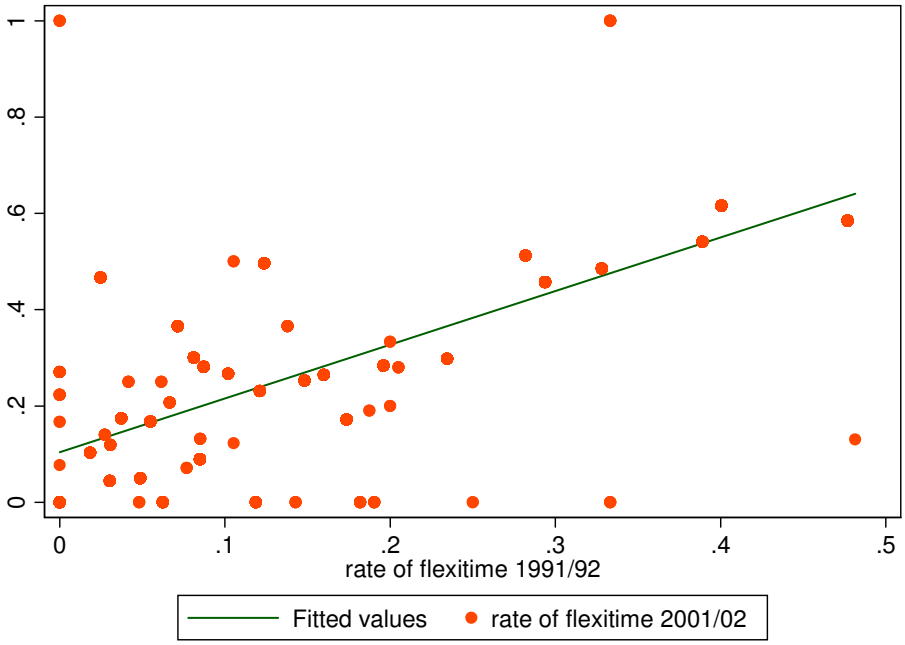
Table 8: TU: Flexitime Incidence by Occupation and Sex for All Employed Workers.

	female	**male**
agriculture & mining	0.132	0.109
paper & wood	0.000	0.000
metal production & processing	0.000	0.176
engineering	0.071	0.070
metal construction	0.111	0.083
textiles & leather	0.500	0.500
food	0.000	0.200
construction	0.053	0.036
upholsterers	0.000	0.000
painters	0.000	0.000
packers	0.000	0.000
machine operators	0.000	0.000
engineers, chemists, pysicists	0.286	0.216
merchants & traders	0.239	0.276
transport	0.115	0.093
management & consulting	0.300	0.293
office occupations	0.532	0.473
security operations	0.130	0.071
artists & authors	0.000	0.000
medicine & health	0.042	0.048
social services	0.382	0.404
other servicde occupations	0.000	0.000
others	0.222	0.286

rived from the second wave of the German Time Use Data (2001/02).[12] It captures the difference in occupation- and sector-specific tendencies of flexitime arrangements and it is appropriate if employers acknowledge that such working schedules influence the work output positively. In addition, information about the incidence of flexitime arrangements for the second wave aggregates choices that were taken *after* the survey year of interest. It can therefore be assumed that the exclusion restriction is highly correlated with the incidence of flexitime arrangements in different jobs and industries in 1991/92 but it does not affect parental time during the year of the analysis. The strong positive correlation of the rate of flexitime arrangements in 1991/92 and 2001/02 is further depicted in figure 5. It can therefore be concluded that the rate of flexitime in 2001/02 is an appropriate exclusion restriction for the identification of possible non-random selectivity within sectors and occupations.

[12] I tried different other exclusion restrictions: (i) the rate of shift work by sector and occupation in Eastern Germany only in 2001/02 and (ii) the rate of shift work in West Germany in 1991/92. Both other exclusion restrictions deliver very similar results to those reported here.

Figure 5: TU: Correlation between the Rate of Flexitime Work in 1991/92 and 2001/02.



A selectivity corrected model, also known as treatment effects model, is estimated and selected results are reported in table 9. Estimates of the flexitime indicator, the selection term as well as the coefficient estimate of the main exclusion restriction of the first stage probit model by gender and employment status are presented. First, the table reveals that the rate of flexitime in 2001/02 by sector and occupation is highly significant in all regressions and is strongly positively correlated with the probability to be granted flexible working schedules. Consequently, the sector- and occupation-specific tendencies are well captured by this term.

Moreover, the selection term is insignificant in all cases which suggests that selection of workers in different occupations and sectors for unobserved occupational differences that are correlated with parental time is no issue in Eastern Germany in 1991/92. The only exception is obtained for full-time employed men on the total minutes of childcare time. Yet it is safe to assume that flexitime is rather granted to women for childcare reasons and it rather unlikely for men. OLS estimates are hence adequate when the causal effect of temporal work flexibility on parental time is explored. Selection corrected estimates further show a negative though insignificant selection term in the case of minutes of parental time. This suggests that OLS estimates are slightly downward biased. The coefficient estimates of the flexitime indicator reveals that parents who are granted some degree of temporal work flexibility spend on average about half an hour more on childcare related activities. However, the fact that the selection term is not significant indicates that OLS estimates are appropriate to estimate the effect of flexitime on parental time.

Table 9: Coefficient Estimates of Flexitime Indicator, Selection Term and of the Exclusion Restriction from a Treatment Effects Model on Parental Time by Gender and Employment Status.

	employed		**full-time**	
	female	male	female	male
1. minutes of child time:				
flexitime	32.022*	28.124*	39.776*	33.963*
	(2.03)	(1.67)	(2.21)	(1.99)
selection term ($\hat{\lambda}$)	-11.506	-15.650	-16.703	-18.396*
	(1.18)	(1.57)	(1.52)	(1.82)
rate of flexitime (1st stage)	1.286*	1.075*	1.106*	1.064*
	(4.04)	(3.21)	(3.24)	(3.16)
N	561	591	455	580
2. log minutes of child time:				
flexitime	0.000	0.059	0.129	0.173
	(0.00)	(0.15)	(0.36)	(0.44)
selection term ($\hat{\lambda}$)	0.164	-0.025	0.093	-0.082
	(0.85)	(0.11)	(0.43)	(0.35)
rate of flexitime (1st stage)	1.260*	1.046*	1.153*	0.975*
	(3.17)	(2.45)	(2.69)	(2.20)
N	389	365	318	356
3. fraction of total household time:				
flexitime	0.074	0.048	0.164*	0.059
	(1.18)	(0.58)	(2.37)	(0.69)
selection term ($\hat{\lambda}$)	-0.002	-0.035	-0.064	-0.041
	(0.04)	(0.71)	(1.53)	(0.81)
rate of flexitime (1st stage)	1.286*	1.075*	1.106*	1.064*
	(4.04)	(3.21)	(3.24)	(3.16)
N	561	591	455	580

Absolute $t-$ statistics in parentheses. * indicates significance levels of 10% or higher. Standard errors are robust. Additional control variables: age, 2 skill dummies, a dummy for being married as well as regional dummies accounting for GDP per capita and agglomeration types. Additional exclusion restriction: dummy for white-collar workers.

5 Can the Results be Generalized?

East German workers are socialized differently than Western Germans and also the labor market in the former GDR was very particular as described in section 2.1. Consequently, it is possible that attitudes towards work and spending time with kids differ entirely but also that the sample itself is non-representative for Germany as a whole. In order to test whether the results obtained so far for East Germans also hold for all Germans a decade later, I will now use a different dataset,

namely the German Socio-Economic Panel (GSOEP) for the years 2002 – 2008. The sample is again restricted to all employed workers under the age of 55 with kids under the age of 15.

5.1 Definition of Variables and Sample

Apart from a wide range of socio-economic information and workplace related characteristics, the GSOEP data contains information on average hours spent on childcare related activities during a typical weekday. Respondents do not fill in diaries but report the estimated average amounts of time. Accordingly, all sorts of activities that are enjoyed together with kids are contained by this activity aggregate. It is therefore not merely primary childcare time that the variable comprises as in the case of the German Time Use Survey. Secondary activities like watching TV together with the kid or eating dinner with the whole family or doing other things while the child takes a nap are also counted. An additional short-coming of this variable is that respondents can only specify integer hours of childcare time so that the individual variability of this variable between years is limited.

Moreover, detailed information on temporal work flexibility is scarce in this dataset. To approximate temporal work flexibility, I define temporal work flexibility by all people who indicate to start their workday at varying time intervals. This information is only available biannually between 2002 and 2008. Various reasons are possible as to why parents and particularly mothers start to work at different time intervals of the day. I will therefore analyze the influence of temporal work flexibility on parental time again by employment status. Since people with flexible working schedules might be compositionally different from those who work flexitime and were analyzed by the German Time Use data in the previous section, I will examine the determinants of work with such schedules more closely in section 5.3.

Summary statistics of the sample are shown in table 10 for all employed men and women. It shows similar things as for the East German parents: men are slightly older, are more likely to be married and tend to have on average more children than women. The years of schooling are slightly higher for men. Only about 25 percent of all employed German women work full-time in the years 2002 – 2008.

5.2 Descriptive Statistics: Parental Time with Children

Table 11 reports the allocation of average childcare time and market work for a usual workday by sex, employment status and depending on the flexibility status. Compared with the information

Table 10: GSOEP: Summary Statistics for employed workers by gender.

	women	**men**
individual characteristics:		
age	34.39	40.30
	(5.85)	(6.03)
years of schooling	12.27	12.41
	(2.39)	(2.69)
married	0.79	0.93
	(0.41)	(0.25)
full-time employed	0.25	0.96
	(0.43)	(0.19)
household characteristics:		
# of kids	1.70	1.89
	(0.72)	(0.82)
kids ≤ 3	0.07	0.07
	(0.26)	(0.25)
kids aged 3–6	0.21	0.23
	(0.41)	(0.42)
kids 6–10	0.62	0.59
	(0.49)	(0.49)
kids 10– 15	0.49	0.50
	(0.50)	(0.50)
	3267	3618

Standard deviations are given in parentheses.

on primary childcare time derived from the time diary information of the German Time Use Data, parental time reported here which includes secondary parental time is much higher.[13]

Table 11 shows that all employed mothers devote on average 5.1 hours on childcare activities between 2002 – 2008 and full-time employed mothers about 3.3 hours. Women who start their workday at varying time intervals tend to spend on average about 22 – 54 minutes more time with their kids. The table additionally shows that full-time employed women report to work on average more than 8.7 hours. By including also part-time employed mothers, average market work amounts to an average of 5.8 hours. In this case, women who have some temporal work flexibility report to work 32 – 42 minutes less.

Men, in contrast, tend to spend only about 1.5 hours on childcare activities during a usual workday but there is virtually no difference by differentiating by the degree of temporal work flexibility.

[13] It has to be furthermore noted that the definitions of the activity aggregates are not comparable across the data sets.

Table 11: GSOEP: Allocation of Average Child Time and Market Work by Gender and Flexibility Status.

	women			**men**		
	all	no flex.	flex.	all	no flex.	flex.
full-time employed						
hours of child time	3.34	3.03	3.94	1.49	1.47	1.53
	(3.71)	(3.20)	(4.50)	(1.71)	(1.74)	(1.65)
hours of market work	8.74	8.92	8.39	9.82	9.93	9.59
	(1.76)	(1.71)	(1.80)	(1.64)	(1.10)	(1.75)
N	819	542	277	3485	2353	132
all employed						
hours of child time	5.11	4.98	5.35	1.52	1.50	1.56
	(4.76)	(4.71)	(4.83)	(1.78)	(1.82)	(1.68)
hours of market time	5.83	6.09	5.36	9.70	9.83	9.43
	(2.76)	(2.69)	(2.82)	(1.81)	(1.71)	(1.97)
N	3267	2099	1168	3618	2438	1180

Standard deviations are given in parentheses.

Regarding working hours, fathers report to work on average almost 10 hours. Men without flexibility report to work on average about 20 minutes longer.

Figure 6: GSOEP: Distribution of Parental Time with Kids for Full-time Employed Germans by Gender.

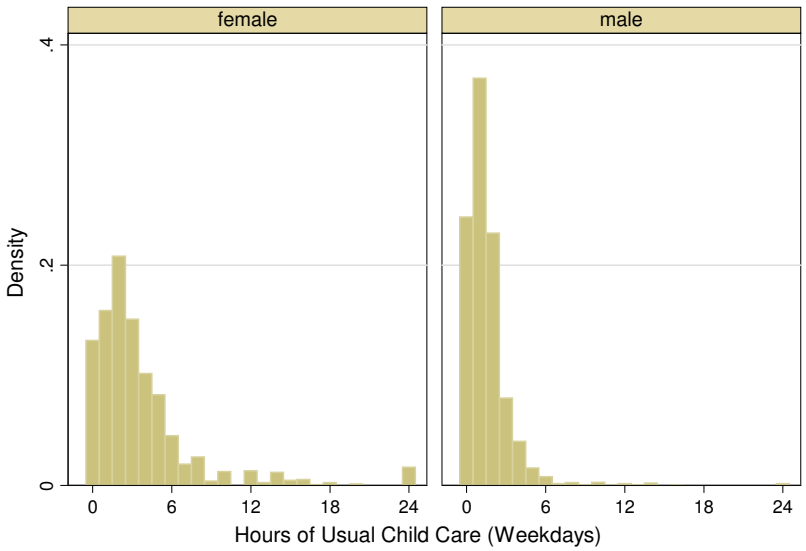
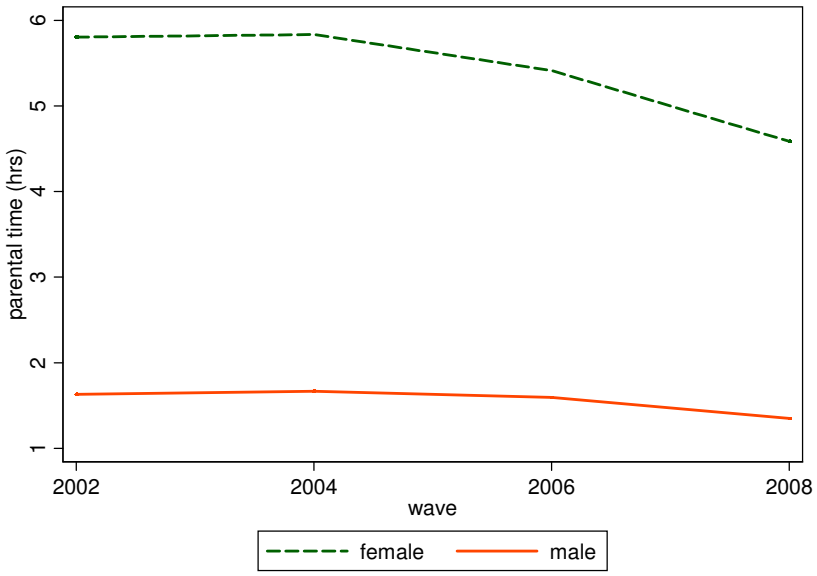


Figure 6 shows the distribution of parental time by gender for full-time employed parents. While most men devote at most 2 hours on childcare activities, the distribution of mother's time is wider. The evolution of parental time with children over the sample period is further illustrated by figure

7. Employed mothers devote significantly more time to child care related activities than fathers over the whole time period. However, average parental time decreases from 2001 to 2008 but to a larger extent for women. While mothers spent on average about 5.8 hours on childcare time in 2002, the average time drops to 4.6 hours in 2008. Fathers, who devoted about 1.7 hours in 2002 on average, enjoy only 80 percent to be with their kids at the end of the sample period.

Figure 7: GSOEP: Parental Time with Children of Employed Parents by Sex (2001 – 2008).



Even though the absolute amounts of time devoted to parental time differ between the datasets due to different definitions, the direction of impact is the same: women devote more of their time to be with their kids when their jobs allow for some kind of temporal flexibility. The association is however less pronounced in the case of fathers. The preceding analysis will show whether this is robust after controlling for pre-determined characteristics.

5.3 What determines a Varying Start of the Workday?

Table 12 shows the marginal effects of the determinants of temporal work flexibility as defined here by employment status and gender. The probability to choose such a job tends to decrease with tenure and age for women and with years of schooling for men.

Employed mothers with kids under the age of 6 tend to be more likely to start their workday at different time intervals while the opposite holds for fathers. This is one indication that the temporal work flexibility is endogenous and is likely to be driven for childcare concerns. The number of kids has no influence on the mother's decision yet it is associated with lower probabilities for fathers.

Table 12: GSOEP: Marginal effects on the choice of starting to work at varying time intervals by sex and employment status.

	employed		**full-time**	
	female	male	female	male
personal characteristics:				
age	-0.004*	0.001	-0.010	0.000
	(1.66)	(0.17)	(1.62)	(0.04)
yrs. of schooling	-0.004	-0.027*	-0.006	-0.028*
	(0.82)	(5.62)	(0.61)	(5.65)
married	-0.009	-0.009	-0.032	-0.029
	(0.36)	(0.26)	(0.76)	(0.76)
german	-0.030	-0.015	0.024	-0.012
	(0.84)	(0.53)	(0.35)	(0.41)
household characteristics:				
# of kids	0.012	-0.018*	0.010	-0.015
	(0.84)	(1.72)	(0.32)	(1.39)
kids < 3	0.086*	-0.092*	-0.060	-0.094*
	(1.68)	(2.32)	(0.52)	(2.35)
kids 3–6	0.013	-0.043	-0.111*	-0.052*
	(0.41)	(1.61)	(1.73)	(1.91)
kids aged 6–10	0.034	-0.013	0.037	-0.016
	(1.50)	(0.61)	(0.79)	(0.75)
workplace characteristics:				
white-collar	0.042*	-0118*	0.024	-0.123*
	(1.91)	(5.79)	(0.47)	(6.00)
log labor income	-0.035*	0.033*	-0.004	0.030
	(2.89)	(1.84)	(0.17)	(1.42)
tenure	-0.002	-0.001	-0.007*	-0.001
	(1.11)	(0.63)	(2.05)	(0.74)
exp.: full-time empl.	0.004*	-0.004	0.008	-0.004
	(1.66)	(1.42)	(1.48)	(1.31)
exp.: part-time empl.	0.003	0.012	-0.008	0.015
	(0.81)	(1.48)	(1.10)	(1.64)
exp.: unempl.	-0.005	-0.006	0.010	-0.013
	(0.69)	(0.77)	(0.78)	(1.63)
service sector	0.087*	0.038*	0.022	0.039*
	(3.61)	(2.13)	(0.45)	(2.16)
second job	-0.055	-0.027	-0.130	-0.040
	(1.00)	(0.48)	(1.23)	(0.79)
no coworkers	0.171*	-0.053	0.198*	-0.022
	(3.64)	(1.08)	(1.91)	(0.44)
firm size: < 5	0.018	-0.247*	-0.083	-0.253*
	(0.50)	(6.62)	(1.03)	(6.59)
firm size: 5–200	-0.001	-0.280*	-0.031	-0.282*
	(0.05)	(13.55)	(0.59)	(13.61)
firm size: 200–2000	0.053	-0.113*	-0.023	-0.111*
	(1.57)	(4.97)	(0.37)	(4.89)
N	2656	2965	655	2866
R^2	0.040	0.097	0.073	0.104

Absolute $z-$ statistics in parentheses. * indicates significance levels of 10% or higher. Additional explanatory variables comprise for the time use data: regional dummies, dummies for self-employment, conservative political beliefs, having an employed partner, as well as the number of weekly working hours and the years of unemployment experience.

When it comes to workplace characteristics I find that, like for East Germany, service sector employees and parents employed in white-collar job tend to have a greater probability to start their workday at different time intervals. While the work biography does not matter for father, mothers with more years of full-time experience tend to be more likely to have some degree of temporal work flexibility. In addition, mothers who work in firms with no other coworkers also tend to have a higher probability. The probability of men for being granted some flexibility is highest when they work in firms with more than 2000 employees. Furthermore, log labor incomes are negatively associated with this choice when all employed mothers are regarded and the opposite holds for men. Others workplace characteristics do not have a significant impact on the choice of such a job.

5.4 Empirical Specification and Identification

The impact of temporal flexibility on parental time will be estimated by the following estimation equation:

$$\ln C_{it} = \mathbf{X}'_{it}\beta_1 + \beta_2 F_{it} + \gamma_t + \gamma_i + \epsilon_{it}. \tag{2}$$

where $\ln C_{it}$ is the log of childcare time reported by respondent i at time t. The main variable of interest is F_{it} which is again an indicator variable that takes the value 1 if the person has some temporal work flexibility and 0 otherwise. The respective coefficient β_2 therefore estimates the impact of childcare time due to being granted some degree of temporal work flexibility. Moreover, I control for time fixed effects, γ_t, to account for the fact that parental time with children generally trends downward over the observation period. Moreover, individual fixed effects, γ_i, are added in some specifications. Consequently, I compare individuals who are exposed to temporal work flexibility with those who are not. The matrix $\mathbf{X}_{it}$ contains pre-determined control variables such as age, years of schooling, federal state dummies and dummies for being married and holding the German citizenship.

The main problem to identification in this context is reverse causality. Parents are free to choose their jobs given the pecuniary and non-pecuniary compensation package offered. Workers and in particular mothers therefore tend to choose jobs that offer flexibility because of childcare considerations. In this case, OLS estimates are biased. To deal with this concern, I use an instrumental variable approach in which I instrument the indicator of temporal work flexibility, F_{it}, with the

rate of temporal work flexibility by occupation and sex of parents with children older than 10. This instrument is highly correlated with the individual inclination to have some degree of temporal work flexibility and it further takes account of the fact that flexibility is more likely to be granted in particular industries. Section 4.2 has further shown that parents and in particular fathers of older kids set their priorities independent from childcare concerns. For the instrument to be exogenous to the error term, it is important that the individual who works in a job that grants flexibility of working schedules to have more time with kids only operates through those parents with young kids who are excluded from the instrument.

These assumptions are relatively plausible as the instrument accounts for the fact that flexibility is more likely in particular industries. In addition, it is mainly parents of younger kids who choose to work in jobs offering temporal work flexibility in order to be with their kids, which is picked up. Older kids need less attention of their parents and teenagers might sometimes even refuse to spend more time than necessary with their parents. It follows that for parents with kids above the age of 10, the choice for a job that offers flexible working hours is not motivated by childcare concerns but by other factors.

5.5 Description of Results

Estimation results on log hours of parental time are reported in table 13. Column (1) presents results from pooled OLS regressions and column (2) shows IV estimates accounting for reverse causality. Column (3) reports results from fixed effects regressions and finally, column (4) depicts coefficient estimates of instrumental variable fixed effects regressions.

As before, each cell of the table corresponds to a coefficient estimate of the flexibility indicator of separate regressions by employment status and sex.[14] The results generally corroborate earlier findings in that they suggest that temporal work flexibility increases parental time in particular of mothers.

Pooled OLS results are reported in the first two columns of table 13. They indicate a positive effect of temporal work flexibility and maternal time. The Pooled IV results indicate that full-time employed women tend to spend on average about 9.6 log points more on childcare related activities. In absolute terms, these mothers devote about 0.32 hours or 19 minutes more of their time to be with their kids which is slightly increased as compared to the estimates obtained from time use data presented in table 4. This estimate is however not accurate. A possible reason could be the low variation of the average childcare time as people were allowed to report merely integer hours.

[14] Predetermined variables such as age, years of schooling, marital status, German nationality, dummies for the federal state of residence and time dummies are additionally controlled for.

Table 13: GSOEP: Coefficient Estimate on Log Parental Time by Gender. OLS, IV and Fixed-Effects Regressions (2002 – 2008).

	OLS		**FE**	
	OLS (1)	OLS-IV (2)	FE (3)	FE-IV (4)
female workers:				
full-time employed	0.214*	0.096	0.034	0.603
	(3.73)	(0.71)	(0.36)	(1.51)
first stage F-statistic	–	174.67	–	9.90
N	592	448	592	363
R^2	0.123	0.160	0.085	0.066
part-time employed	0.068*	0.178*	0.055	-0.114
	(1.69)	(1.92)	(1.04)	(0.27)
first stage F-statistic	–	376.86	–	20.40
N	1426	977	1426	836
R^2	0.085	0.085	0.137	0.168
male workers:				
full-time employed	0.036	0.088	0.003	-0.036
	(1.32)	(1.60)	(0.08)	(0.20)
first stage F-statistic	–	591.78	–	27.27
N	1781	1781	1781	1690
R^2	0.108	0.106	0.030	0.021

Absolute $t-$ statistics in parentheses. * indicates significance levels of 10% or higher. Standard errors are robust. Additional controls: age, years of schooling, marital status, German nationality, dummies for federal states of residence as well as time dummies. The first stage F-statistic indicates the Kleibergen-Paap rk Wald F-statistic.

A comparison of the pooled OLS and IV estimates as reported by columns (1) and (2) further reveals the expected upward bias of simple OLS estimates when reverse causality is not accounted for. Coefficient estimates obtained from fixed effects regressions need to be regarded with caution exactly due to the low degree of changes in the flexibility indicator over time among individuals. Yet, the direction of impact is the same as before although the coefficient estimates are insignificant: full-time employed women who are granted some degree of temporal work flexibility spend more time on childcare activities than the reference group. The table additionally presents F-statistics of the instrument for the first stage regressions. The instrument is well suited for the pooled OLS regressions yet it is weaker in the case of instrumental fixed-effects.

The second panel of table 13 presents estimation results for part-time employed women who account for about 75 percent of all employed women in the sample. Such work itself grants already

a higher degree of temporal flexibility. I will now analyze and quantify how time with children is additionally affected by starting the workday at different time intervals. The OLS estimates suggest that such women spend about 18 log points more on childcare time than part-time employed women with fixed schedules. Results from fixed effects regressions reveal however, that among the changers, being granted some degree of temporal flexibility reduces parental time with kids. However, only 20.6 percent of all part-time employed change the flexibility status over the years. Consequently, the coefficient represents only the decision of one fifth of the sample and must therefore be regarded with caution. The F-statistics of the first stage regression indicates that the instrument is again well suited in this case.

In the case of men, the OLS estimates show that being granted some degree of temporal work flexibility increases the time that fathers spend with their kids by about 8.8 log points which corresponds to an increase by 8 minutes. A comparison of the coefficient estimates of pooled OLS and IV regressions reveals a downward bias of the simple OLS estimates when reverse causality is not accounted for. Fixed-effects regressions, in contrast, show that temporal work flexibility hardly affects paternal time with kids. These results are not very surprising yet must again be considered with even greater caution. Firstly, fixed-effects regressions only explain the behavior of about 15 percent of the full-time employed fathers and 35 percent of these few changers even report multiple changes. In addition, figure 6 shows that the variability of paternal time with kids is low for only integer numbers of paternal time are allowed to be reported by the respondents of the survey.

It can be concluded from these results that the temporal work flexibility increases parental time with kids. The findings of the time use data for East Germany shortly after the re-unification can be confirmed for all German workers between 2002 and 2008.

6 Conclusion

Childcare activities are still largely perceived as female responsibilities. Yet, better occupational careers and equal opportunities for women will further weaken the differentiation into male and female tasks in the future. The impeding shortage of skilled labor in combination with an aging work force and falling birth rates will additionally make political measures that enhance female labor force participation indispensable. The importance for the creation of measures that facilitate the reconciliation of family and work will be growing even more. In this context, this paper examines the casual link between temporal work flexibility and parental time with children and seeks to quantify this effect. This is an important issue not only because it alleviates the stress of mothers

who have to juggle work and family and thus contributes positively to the well-being of the whole family. In addition, time investments are major determinants for the cognitive development of children in particular during the first year of a child's life. Yet, maternal employment during these years is found to negatively affect the child's cognitive development (Baum 2003, Brooks-Gunn et al. 2003, Ruhm 2004, Hill et al. 2005, Ruhm 2008, Bernal 2008).

For identification, I exploit the German re-unification as quasi-experiment. Even though, both parts of Germany were subject to similar regulations before 1990, the economic situations were very different. The particularity of the East German labor market can be employed to identify the causal link. More precisely, childcare facilities were almost ubiquitous in East Germany and the job choice was strongly restricted by the requirements of the centrally planned economy yet not by individual preferences. Working conditions can hence be regarded as being exogenous and are not subject to choice. The analysis of this paper is based on German Time Use Data for the year 1991/92. By means of GSOEP data for 2002 – 2008, the results obtained for Eastern Germany are found to be generalizable to Germany as a whole. The identification for this dataset is obtained by an instrumental variable approach.

The estimation results suggest that flexibility with respect to the organization of working hours increases parental time in particular of mothers by about 30 percent. While the positive effect is independent of the child's age for mothers, I find that flexitime arrangements increase paternal time only for kids under the age of 10. For older children, however, the opposite is found which suggests that these fathers rather substitute their non-market time away from child related activities as these kids need generally less attention and care from their parents. In addition, with an increasing position in the child time distribution, also the positive effect of temporal work flexibility intensifies drastically.

The results are robust and indicate that flexible working schedules indeed enhance the reconciliation of family and work not only for mothers. No evidence for systematic selectivity of flexitime arrangements in certain occupations is found for East German workers. Results obtained from GSOEP data for Germany as a whole further reveal that OLS estimates tend to overestimate the true influences of temporal work flexibility for mothers but underestimate the impact for fathers.

Increasing the labor supply of women is high on the political agenda. In order to encourage aggregate domestic demand and to boost aggregate domestic production and therefore to spur aggregate economic growth in the medium-run, it is essential for each country to use the total labor market potential. To give women an incentive to supply work at the extensive and intensive

margin requires a reconciliation of family and work. As the example of the former GDR shows, measures to enhance temporal work flexibility can only work in combination with an expansion of the provision of childcare facilities. A further modification of the tax system for married couples that discourages female labor force participation in Germany are additionally needed to improve the labor market situation and thus to stimulate growth.

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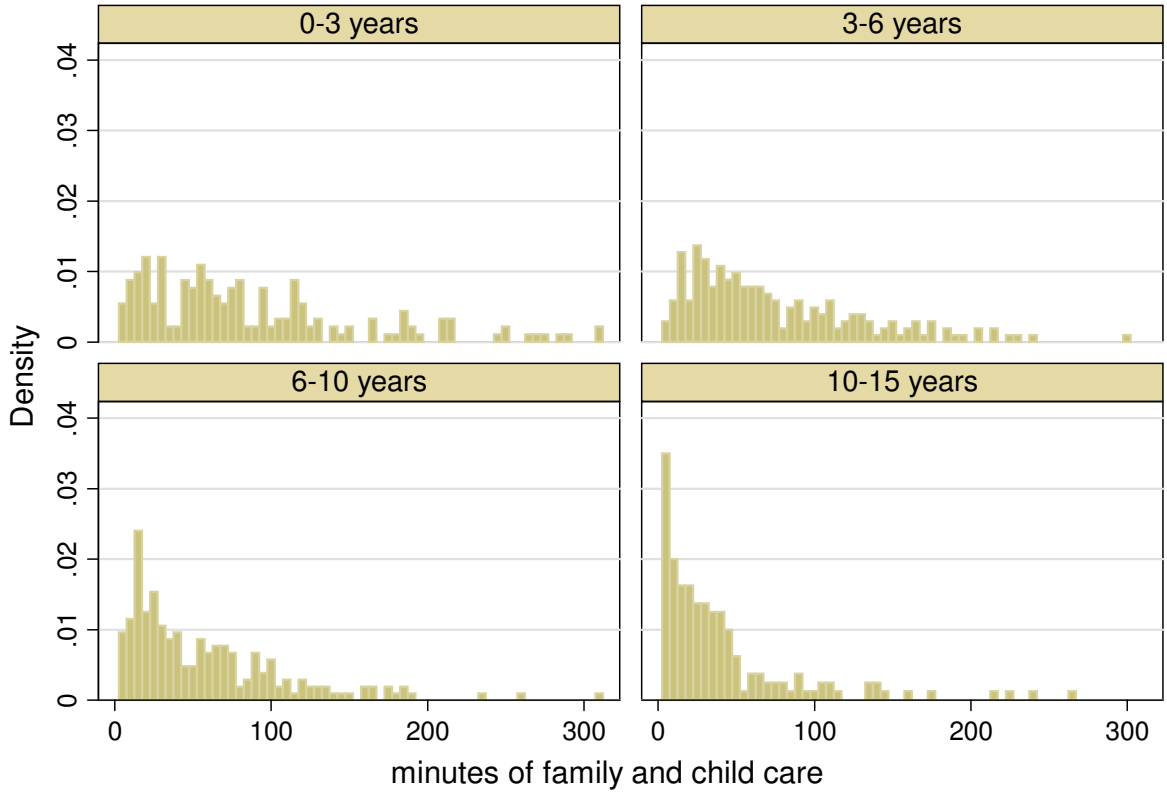
Appendix

Figure 8: Time Use: Distribution of Parental Time of Full-Time Employed East Germans by Age of Kids.



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